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TROPHIC CASCADES AND COMPENSATION: DIFFERENTIAL RESPONSES OF MICROZOOPLANKTON IN WHOLE-LAKE EXPERIMENTS

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Abstract. Food webs in three lake basins were manipulated by altering fish communities to either reduce or increase the abundance of *Daphnia*. These basins were subsequently fertilized with nitrogen and phosphorus for two years. We tested three predictions about the response of heterotrophic flagellates, ciliates, and rotifers (collectively, microzooplankton) derived from prior studies. We predicted that (1) microzooplankton would increase with lake fertilization, (2) lakes with abundant *Daphnia* would have lower increases in microzooplankton, and (3) both increases in resource availability *and* suppression by *Daphnia* would determine microzooplankton dynamics. Contrary to the first prediction, microzooplankton did not increase with fertilization relative to the reference lake, except in the low-*Daphnia* system. The second prediction was supported, as *Daphnia* prevented microzooplankton from increasing in the fertilized lakes with the strength of the *Daphnia* effect being greater than anticipated. Because of this strong effect, microzooplankton dynamics were in all but one case most strongly related to suppression by *Daphnia* rather than to a combined effect of resources and suppression. The microzooplankton communities were differentially affected by the trophic cascade. Heterotrophic flagellates appeared to be limited by a variety of predators. Even in the low-*Daphnia* fertilized lake, mortality was apparently high. Ciliates and rotifers increased in the low-*Daphnia* fertilized lake and were strongly suppressed otherwise. These experiments indicate that small-scale, short-term experiments and larger-scale comparative analyses may be inadequate for assessing the strength of trophic interactions. The potential for community-level responses, not well assessed except at the ecosystem scale, may alternatively dampen or enhance the impacts of trophic cascades in food webs.

Key words: ciliates; Daphnia; *ecosystem experiments; flagellates; lakes; rotifers; trophic cascades; zooplankton.*